River Mile 10.9 Removal Action Pre-Design Report, LPRSA, November 30, 2012

Comments by NJDEP, January 4, 2013

Response to former NJDEP comments received by CPG on Nov. 12, 2012

Prior NJDEP comments were addressed by providing additional detail. However, a few responses require some follow up as indicated below:

The CPG reports that a review of bathymetry survey results for this section of the river can be provided in December. Please clarify if this has been included in the Pre-Final Design documents submitted to date, or please identify which document will contain this information.

In response to former NJDEP comment 9a, the CPG states that current surface concentrations (which are reported to be similar to concentrations at 2 ft.) are shown to be "within acceptable standards for dermal exposure" (see page 3 of 14, RTC for DEP comments). Since 2,3,7,8,-TCDD concentrations at these intervals are known to be 10,000 – 30,000 ppt (and as high as 57,000 ppt) clarification is needed for the intent/purpose of the referenced statement as these levels are not considered acceptable for human health direct contact exposure. 2,3,7,8,-TCDD (TEQ) levels considered to be acceptable for not causing non-cancer health impacts are in the realm of 50 ppt for residential use and 700 ppt for non-residential use areas.

CPG requested clarification of former ARAR comment 16: The original comment was meant to have CPG ensure that all site-specific contaminants are accounted for in this project and not just those listed in the first draft of Table 2-4. The revised Table 2-4 is inclusive by reference and therefore acceptable.

Review comments on Pre-Final Design documents, 11/30/2012, and Appendices

General Comment: The Pre-Final Design Report may underestimate the potential for sediment and associated contaminants (including colloidal and dissolved forms – these have not been addressed in the report) to be dispersed from the project area. To address this concern, a comprehensive surface water quality monitoring program should be implemented; the scope of this program should be developed by the USEPA, NJDEP and the CPG. Suggestions are provided below in response to Sections 2 and 4.

1. Section 1.1, page 1-1 and Figure 1-2: Related to the bathymetry comment above, the effects of Hurricane Sandy on bathymetry in the Removal Area., and thus potentially on the scope of the Removal Action, should be evaluated prior to the implementation of the Removal Action.

2. Section 2.1, paragraph #6, page 2-2: The size of the mixing zone (and thus the locations of the up-stream and downstream surface water quality monitoring locations) should be consistent with the requirements in N.J.A.C. 7:9B (see Table 2-4). Please verify that this is the case and describe how this was determined. Although this project is not a formal NJPDES discharge point, the proposed operation on the whole, is similar to one. In this case, re-suspension within a certain distance from the dredge operations (these could be predicted via the DREDGE model, Section 4.4.2 and/or other predictive methods using site-specific information) is expected. The site specific trigger and action levels (Section 4.6.1.3) for addressing sediment re-suspension conditions should be applied outside the designated mixing/impact zone.

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3. Appendix A: Figure A-2c requires revision, as the 2,3,7,8-TCDD concentrations are incorrect. Review and verification of other similar figures is recommended. Based on detailed core data maps provided it appears that zones of higher concentrations (in instances orders of magnitude) appear in the upper northeastern 1/3 of the proposed remediation area. Specifically Cores 2011 RM 10.9 – 0326; 0340; 0331; 0323; 0335; 0334 show the highest concentrations in TCDD's, Mercury & PCB's. This being the case, it may be beneficial to target said areas with more rigorous controls while dredging these locations. Such controls could include use of state-of the art siltation curtains to remain in place longer (specified) periods after dredging is done; removal of curtains during slack tides; and /or employment of coffer boxes to sequester and reduce contaminant mobility resulting from dredging these target areas.

4. Section 4.2, Estimated Volume of Dredged Material, sediment, page 4-1: a. This section states that sediment north of Station 31+00 will be dredged to native material because of the steep slope that may not sustain a cap. This is appropriate, however, clarification is needed for: what is meant by "native material" (free of all manmade contaminants, or a certain level of residual contamination?), the anticipated dredge depth, and how this either has been or will be determined. b. In addition, sediment data reveal that at the approximate depth of 2 feet into the sediment bed, certain cores reveal significantly elevated 2,3,7,8-TCDD ($\geq$ 15,000 ppt). Special consideration needs to be given to these areas with regard to either dredging deeper to remove excess concentrations at the cut line, or using special provisions for capping. These locations include: 310, 314, 316, 318, 322, 333, 338, 339, 340, 343, 344, 346, 350 and 351. Comparing Figures 4-2 (existing conditions) and Figure A-1 (Sample locations) indicates that all of these cores are south of Station 31+00. Therefore, additional provisions for addressing excess contamination at the cap interface is needed, particularly in regions of higher sheer stress. This condition requires special attention both during dredging/capping operations and for long-term cap maintenance.

5. Section 4.4.1, page 4-5: This section lists three factors that "are favorable for minimal sediment [and contaminant] resuspension …" This is good information, however, there are also limitations to the applicability of these factors that could result in increased sediment and contaminant resuspension . These include: a maximum river flow condition (needs to be specified) above which dredging operations will cease; the shallow water in the project area which may result in increased disturbance and resuspension of sediment due to the movement of the dredge barges and workboats; and, although the sediment to be dredged does not contain free product, dissolved and colloidal phases of contaminants may also be released into the water column during the dredging operation.

6. Section 4.4.2 DREDGE Model, page 4-5 and Table 4-3: The DREDGE Model input parameters assumes dredged material loss rates of only 0.5% and 1%. Under "typical" maintenance dredging operations up to 5-10% of the sediment to be dredged may be resuspended. In addition, the proposed factors differ substantially from sediment loss rates of 6% recently suggested by the CPG for the 8-Mile FFS project (CAG meeting Dec. 6, 2012, Newark, NJ) and 3%, used by the USEPA for the same project. In addition, through evaluation of the 2005 Passaic River Dredging Pilot Study, researchers estimated that approximately 0.8 to 2.2 % of total sediment mass dredged

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may be released to the water column (Chant, 2007). Thus, it does not seem appropriate to use only 0.5 and 1% resuspension values in the DREGE Model analyses, even though an environmental clamshell bucket will be used and the water column is shallow. These two factors may be counter-balanced by increased disturbance and resuspension of sediment due to the movement of the dredge barges and workboats in such shallow water. For these reasons, the currently proposed sediment loss input parameters for this project require further technical justification. At a minimum, the proposed factors should be modified upwards to be in line with the aforementioned Dredge Pilot findings.

7. The DREDGE Model also uses a 1-year maximum flow of 6,000 ft^3/sec and 0.5 m/sec. Will the Final Design include a BMP limiting dredging operations to flows below these values?

8. Section 4.4.4, page 4-7 and Figure 4-7: The Final Design Report should include a more detailed figure showing the installation and operation of the silt curtain. In addition, operational parameters for removing and reinstalling the silt curtain as the dredge barge and associated work boats moves must be established – for example, a maximum suspended sediment level inside the silt curtain should be established, above which the curtain will not be removed. This is needed to prevent the suspended sediment contained by the silt curtain from being dispersed into the river, thus significantly reducing its effectiveness. In addition, as noted in Section 4.4.4.1, the silt curtain must be designed and operated to "provide sufficient residence time to allow the larger sediment particles to settle out of suspension …"

9. Figure 4-8, Water Quality Monitoring Locations: Neither the text nor this figure describe the basis for the proposed water quality monitoring locations, therefore, this information needs to be provided. Given the tidal river conditions, a minimum of 2 pairs of equidistant upstream and downstream monitoring locations are recommended. It is unclear why the far-field downstream station in Figure 4-8 is almost 3x's the distance from the project's analogous upstream station. Table 4-6 seems to indicate the locations are equidistant. These pairs should be the same distance from the project, unless technical justification otherwise is provided. In addition, this section, or the forthcoming Appendix E (Construction Environmental Monitoring Program) should identify Data Quality Objectives for the monitoring program (including minimum detection limits for all COPCs) which should describe how the goals in Section 2 (ARARs) are to be met by using the tools in Sections 4.4.2 (DREDGE model) and 4.6.1.3 (Monitoring).

10. Section 4.6.1.1, page 4-9, Figure 4-8, and Table 4-6: See Comment #2 to determine the locations of the surface water quality monitoring locations. Please provide the rationale for the assumption that the "dredging area of influence" (i.e. the mixing zone?) is 1,000 feet (300 meters) up- and downstream from the dredging area.

11. Section 4.6.1.2, Initial Dredging Monitoring: The overall framework for the Turbidity and TSS sampling for both the Baseline and Initial Dredging Monitoring is considered appropriate. **a.** To the extent possible, the baseline sampling for TSS should be conducted under a variety of flows and tidal stages. **b.** To strengthen the data collected, the initial turbidity-TSS correlation should be established during the baseline monitoring (Section 4.6.1.1), confirmed during the first 24-48

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hours of dredging, and then on a weekly basis thereafter (or whenever it appears that dredging has resulted in a large increase in suspended sediment levels). Verifying the turbidity-SS correlation should not be limited to the first 48 hours of monitoring during dredging operations. **c.** In addition, sampling and analysis of key project COPCs (2,3,7,8-TCDD, total PCBs and Hg) is needed during these programs to additionally correlate water chemistry to TSS and Turbidity measurements. This is necessary to assist with evaluation/documentation of surface water quality ARAR attainment and to provide, if possible, Turbidity-TSS-COPC chemistry guidelines for feedback to project operations.

12. Section 4.6.1.3, Resuspension Monitoring: The technical basis for the selected Turbidity trigger of 35 NTU and action level of 70 NTU needs to be provided in this section, or appropriately referenced. The turbidity "trigger levels" cannot be firmly established until the turbidity-TSS correlation has been developed. These levels must be set to minimize potential impacts to surface water quality outside of the mixing zone. Further, a relationship between turbidity/TSS and the concentration of the COPCs must be established to determine if the surface water quality criteria for the COPCs are being met when turbidity/TSS monitoring alone is conducted (otherwise, monitoring for turbidity alone is of limited value).

13. The BMPs listed in Section 4.4.3 are those that will be implemented as standard operating procedures . Additional BMPs are needed if the "trigger levels" are exceeded. Periodic water quality monitoring for key COPCs (total and dissolved fractions) should be implemented on a daily basis, with an exceedance of the turbidity "trigger level" resulting in additional monitoring for these COPCs.

14. Section 4.6.1.3, Resuspension Monitoring: **a.** In addition, the proposed application of the trigger and action levels needs to be re-evaluated because, as currently proposed, the trigger level is applied to buoy #2, upstream 1,000 ft., whereas, the action level is applied at buoy #3, downstream 1,000 ft. Instead, both the trigger and action levels should be applied at all stations (fixed or mobile), but at a minimum, the closest station downstream of dredging. **b**. Bullet 3 indicates that chemical monitoring for 2,3,7,8-TCDD, total PCBs and Mercury will only be conducted when dredging has been suspended, which doesn't occur until the action level has been exceeded for a minimum of 1 hour. Chemistry sampling is stated to occur at the buoy location where the "trigger" level was exceeded (this would mean buoy #2, upstream?). First, this is considered too late in the program. Second, this section is confusing and should be re-written to clarify that chemical water quality monitoring for COPCs will occur when Turbidity trigger levels are exceeded, at the approximate timeframe and location of the observed exceedences. **c.**Text states that in addition to real time measurements of turbidity, field measurements of turbidity, TSS will be done at buoys 2 and 3 "and at three locations transect including west, center and east channel". Please clarify: does this mean three transects of west, center and east channel locations, or just one transect of same? Three transects are recommended, as one upstream, and two downstream. Improved description is needed on the location of these transect(s) in relation to the active dredging, and how they are selected. It is anticipated that the above issues (comments 4 – 14) can be addressed in the forthcoming Appendix E, Construction Environmental Monitoring QAPP Addendum, not yet provided for agency review.

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15. The monitoring program should also include an "adaptive management" component to respond to the observed data and modify the program as needed. A flowchart/decision tree is recommended. The monitoring program serves to guide careful management of the dredging operations and to document overall project success towards attaining ARARs. These two goals should be included and clarified in Section 4 and Appendix E.

16. Surface water quality monitoring is also addressed in Appendix D (Section 01 45 16); this appendix should ultimately be revised to be consistent with the Final Design Workplan and Report.

17. Section 4.6.1.4, page 4-12: Please clarify the location of the "sediment stockpiling area" referred to in this section.

18. Section 6.2.4, page 6-3: Bench-scale testing will be required to verify that stabilizing the dredged material with Portland cement will not result in air quality emissions exceeding those in the processing facility's permits. In addition, such testing may be required by the operator of the ultimate disposal facility for the processed dredged material to verify it is physically suitable and environmentally acceptable for disposal at that facility.

19. Section 4.6.3, Noise: This section seems appropriate as currently described, however CPG needs to verify/coordinate with the appropriate Lyndhurst authorities on the goals/actions described.

20. Section 7.1 – Design Criteria: First paragraph, second sentence, add the term "physically" to the phrase "to chemically isolate…" and add "particulates and " to the phrase "dissolved constituents" . In addition, cap design should include/consider an upper bound condition of a 500 year flood, as already suggested by USEPA.

21. Section 7.1, page 7-1, Key Design Criteria, 6th bullet regarding pore water: This bullet describes several methods that may be used to determine current sediment pore water concentrations of key COPCs. To be conservative, this should be revised to read "…based on the greater of either …".

22. Section 7.2.1, page 7-2: It is noted that additional studies are underway and proposed for the near future to obtain data needed to finalize the design of the cap. The Department may make additional comments on the proposed cap after its design has been finalized.

23. Section 7.2.2.1, paragraph #2, page 7-7 and Table 7-2: It is recommended that in depths deeper than -3.0 feet, the armor stone have a D_{50} of 4.5 inches; at depths shallower than -3.0 feet, the D_{50} should be 2 inches. However, the data in Table 7-2 suggest that, to be conservative these D_{50} values should be larger. Re-evaluation/clarification of this issue is needed.

24. Section 7.2.3, Layers: Please provide the approximate thickness of the "reactive core mat" and its expected, reliable-use timeframe.

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25. Section 7.2.4, page 7-9: The area between STA 31+00 and STA 37+50 will not be capped, but will be dredged to the depth of native material. Unless backfilled, this will leave a depression (of unknown depth) in the river bottom directly north/upstream of the capped area. Given the hydrodynamics in the Removal Area, could this result in currents and erosive forces adversely impacting the cap? If so, this concern needs to be addressed.

26. Section 7.3, paragraph #2, page 7-9: Revise to read "… less than -3 ft will have a D_{50} of 2 in. The armor … greater than -3 ft will have a D_{50} of 4.5 in. But also see Comment #23.

27. Section 7.6.1, page 7-10: Although the intention is to place an average Armor Stone Type B layer 12 inches thick, the minimum thickness criteria is only 4.5 inches (based on Palermo et al., 1998; Section 7.2.2.1). This is a very large difference between the target average and acceptable minimum thicknesses. Therefore, it is recommended that the Armor Stone Type B layer thickness minimum criteria be increased. This would also be more consistent with the placement tolerance and accuracy requirements specified in Section 7.6.2.

28. Section 7.6.1 Placement Thickness Criteria: Based on this section, please clarify if total cap thickness is slated to be 1 ft., 1.5 ft. or 2 ft.? As currently stated, it appears to be approximately 1 ft. thick. Will there be different thicknesses depending on location in the removal area to address more severe conditions (higher contaminant levels at cap interface, higher sheer stresses)?

29. Section 7.8.1, paragraph #3, page 7-12: The specific BMPs to be used to control sediment resuspension during the capping operation should be identified. In addition, if the monitoring "trigger levels" are exceeded during the capping operation, the additional BMPs to be implemented should be specified.

30. Section 7.9 Project and Community Health and Safety: As referenced in Section 7.9, a Community Health and Safety Plan (CHSP) will be developed. An outline of the CHSP was provided in Appendix G. Please note that RM 10.9 sediments have elevated levels of several toxic contaminants; therefore, perimeter air monitoring during dredging activities needs to be performed for key project contaminants 2,3,7,8-TCDD, total PCBs, and Mercury. Also, hydrogen sulfide monitoring is required to address potential odor concerns.

31. Section 8.2, page 8-1: **a**. Since it will be the processed (i.e. stabilized) dredged material (PDM) that will be transported to and disposed of at an out-of-State facility, bench-scale testing of the PDM should be conducted to provide the data needed by the operator of the facility. The owner/operator of this out-of-State facility must certify to the Department that the PDM is physically suitable and environmentally acceptable for disposal at the facility. **b**. In addition, the operator of the out-of-State facility may require periodic testing of the PDM as it is produced for "quality assurance" purposes to verify it is suitable for disposal. **c.**Similar testing may be required by the operator of the wastewater treatment facility for the barge decant water. Likewise, the owner/operator of the wastewater treatment facility must certify to the Department that the decant water is acceptable for disposal at the facility.

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32. Section 8.2, Regulatory Guidelines, page 8-2: For the described bulk sample locations (selected by review of average COPCs concentrations in the top 0 – 3.5 ft of sediment across the mudflat) please identify the selected core locations and sample intervals via the described analysis in this section, and/or reference on a site diagram. If this was already provided, it should be referenced in this section.

33. Section 8.3, page 8-4: Potential impacts of the transport of the processed dredged material to its final disposal location must be minimized through the development and implementation of appropriate BMPs.

34. Table 8-1 Composite Waste Characterization Profile: For waste characterization purposes using TCLP, it is noted that dioxin, a key driver of this removal action, is not included. Presumably, this is because comparable criteria do not exist, and because, for the purposes of this project, the USEPA has determined that Passaic River dioxin-contaminated sediment is not a listed waste under RCRA. However, since dioxin is a key driver for the project, whole sample analysis/reporting for this parameter is considered necessary for waste characterization purposes and should have been performed/presented in this section. Section 8.2, page 8-4 notes that a QAPP addendum is being developed for additional waste profiling. This comment should be addressed in the forthcoming QAPP. It's possible that existing data may be used for this purpose (sediment evaluation described in Section 8.2, page 8-2) if the existing sampling and evaluation approach is acceptable to waste receiving facilities.

Appendix D

1. Section 01 45 16, Part 1 – 1.01-B, page 13: This states that both the Contractor and CH2M Hill will implement water quality monitoring programs. The scope of these two programs should be specified and clearly delineated, and how they relate to/are consistent with the surface water quality monitoring program presented in the Pre-Final Design Report explained.

2. Section 01 51 01 – Shoreside Support Facilities, page 41: If this section addresses the use of the construction staging area located in the riverside park, see Pre-Final Design Report Comment #8 – revise this section of Appendix D as needed.

3. Section 01 91 14, Part 1 – 1.01, paragraph #3, page 50: The operator of the disposal facility for the PDM may have additional characteristics/requirements that the PDM must meet.

4. Section 01 91 14, Part 2 – 2.01, paragraph #2, page 51 and Part 3 – 3.02-E, page 56: The Contractor's mix design, reagents, etc. must also be approved by, and specified in, the AUD issued by the Department for the dredged material processing facility.

5. Section 01 91 14, Part 2 – 2.01, paragraph #42, page 51 and Part 3 – 3.02-D, page 56: see Comment #3.

6. Section 01 91 14, Part 2 – 2.02-A-5-j, page 54: The QAPP should be developed in consultation

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with the operator of the disposal facility for the PDM and the wastewater treatment facility; also, see Part 3 – 3.02-F, page 56.

7. Section 02 32 00, Part 2 – 2.02-D, page 63: This specifies an 18-inch thick armor layer, not 12-inches (see Pre-Final Design Report Figure 7-2). Clarification/correction needed.

8. Section 02 32 00, Part 2 – 2.05-A, page 64: This requires chemical testing of the sand to meet USEPA requirements; the Department may also have testing requirements for the sand.

9. Section 31 23 24, Part 2 – 2.03, page 80: The barges used to transport the dredged material should have a solid bottom/be sealed (i.e. barges capable of bottom dumping should not be used). Please provide details of the controls that are in place to keep the sediment and water from escaping/discharging from the barge during dredging operation and movement of the barge on the Passaic River.

10. Section 31 23 24, Part 2 – 2.03, page 81: Additional specifications for the installation, operation, monitoring, and removal/movement of the silt curtain should be included; see Pre-Final Design Report Comment #8.

11. Section 31 23 24, Part 3 – 3.01-B, page 82: Will the park be impacted by any of the needed shoreline vegetation removal operations? If so, restoration should be described.

Appendix B, Sect 7.4 - Analysis of Engineering Cap Thickness

Appendix B should be reviewed by an engineer familiar with subaqueous cap durability; the Site Remediation Program defers to the USACE and USEPA for this aspect of the design.

Separately, hydraulic calculations should be provided of the engineered cap with respect to compliance with The Flood Hazard Area (FHA) Control act rules, New Jersey Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq.

Appendix K, Long Term Monitoring and Maintenance of the Cap (LTMM)

General Comments:

The draft Appendix K is incomplete; thus, it is not possible to evaluate the proposed plan. Not all of the referenced figures and appendices are included. In addition, the descriptions of the proposed cap design in Appendix K are different than those in the Pre-Final Design Report (Figure 7-2; for example, see Comment CHECK). The "final" version of Appendix K must be revised to be consistent with the Final (100%) Design Report. Comments are provided below.

This document should be additionally based on technical guidance provided in "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites", USEPA 2005 and any related updates. Chapter 8 is directly applicable and should be used / referenced for this project. Much of the detailed information for this plan has not yet been presented, because Appendices A – D of the LTMM document have not yet been submitted.

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An important aspect of long term monitoring is the ability to compare post remedial action/construction data to pre –remedial conditions, be it, sediment quality, pore water quality or other measures useful for determining success for the remedial action. This document should therefore more clearly link the TCRA remedial action objectives with both current conditions and specific long term measurement goals to determine success over time.

Assessment of Cap boundaries - Either in this document or elsewhere in TCRA Design documents, information is needed on how the edges of the engineered cap and armored areas will be protected from severe erosion. This is important because the areas outside of the designated cap area still contain significant sediment contamination at depth that must not become exposed due to nearby, changed physical conditions.

Specific Comments

1. Section 1.1, page 1-1: This section states "a small portion along the shore … cannot be capped …" The spatial extent of this area should be described and depicted on a site figure. This should include the COPC concentrations in the surface and near surface (.5 – 1.5 ft.) sediment to remain in this uncapped area. Briefly describe, or reference to a later section, how this area, which cannot be capped due to slope instability, will be appropriately addressed. Clarification is needed as to whether this is the area north of STA 31+00 that will be dredged to native material noted in Section 4.2.1, page 4-1 of the Pre-Final Design Report.
2. Section 2.1, page 2-1, paragraph #2: This section states the cap armor will consist of stone from 4 to 7 inches in diameter. However, Figure 7-2 in the Pre-Final Design Report shows, and the NJDEP Response to Comment document (response III-18) states, that the stone will be 2 to 4 inches in diameter.
3. Section 3.1, page 3-1: The remedial objectives of the Removal Action should be stated, with specific monitoring objectives developed to evaluate the success of the Remedial Action in meeting its objectives. The monitoring objectives should be stated in quantitative terms whenever possible.
4. Section 3.1.1, Physical Performance Monitoring, page 3-1: In addition to conducting physical performance monitoring for stresses mentioned in this section (high flows, ice scour, etc.), this monitoring should be done to monitor cap thickness and integrity in response to regular tidal cycles overtime.
5. Section 3.1.2, page 3-1: Given the nature of the armor layer (2-4 inch stone) any "pore water" will be more reflective of the overlying water column than of advection/diffusion from the underlying cap and contaminated sediment. In addition, the settlement of (contaminated) suspended solids from the water column on/into the armor layer over time further complicates the chemical monitoring of the armor layer for evidence of satisfactory cap functionality. Also see Comment #... Therefore, it does not appear useful to monitor the "pore water" in the armor layer.

However, since chemical monitoring is desired, it is recommended that the cap design be modified to facilitate such monitoring. The existing cap design (see Per-Final Design Report Figure 7-2) is schematically shown in (a) below. To conduct chemical monitoring of the cap, it is recommended that the cap design be modified to something similar to that shown in (b). Chemical monitoring of the cap could be conducted in the upper sand layer in (b).

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(a) Existing	(b) Recommended
Armor layer (12 inches)	Armor layer (10 inches? - physical/erosion monitoring)
---------- geotextile	---------- geotextile
Active layer	Sand layer (4 – 6 inches? - chemical monitoring)
Sand layer (6 inches)	Active layer
Sediment	Sand layer (4 – 6 inches?)
	Sediment

6. Sections 3.2 and 3.2.1, page 3-1: Given the RM 10.9 physical conditions, routine physical monitoring should be performed annually at a minimum, not once every 5 years as currently proposed. If event –driven monitoring occurs within a similar time period (within 2 months) as the scheduled, designated routine monitoring timeframe, the latter could be replaced by the event driven monitoring. It is recommended that monitoring be conducted on the following schedule:

- Routine Physical Monitoring: This should be performed once per year (in late spring) for the first 5 years after project implementation; then once every 3-5 years (depending on the results of the first 5 years of monitoring);

- Routine Chemical Monitoring: This should be performed within 1 year of installation and thereafter every 5 years up to 30 years, not at just the 5, 30 and 100 year post -construction marks. At the 30 year mark, a new monitoring schedule may be developed based on environmental condition of the capped area and evaluation of monitoring program to date. This should include consideration of any new/improved cap monitoring methods.

- Event-based Monitoring: The triggers for this monitoring need to be specified. If this monitoring indicates that cap functionality has been potentially compromised, the schedules for the Routine Physical and Chemical Monitoring should be "reset".

7. Section 3.2.2- Event-Based Monitoring – **a.** The triggers need to be specified for the Event-based Monitoring; i.e. what is the "designated river flow event" that will trigger this monitoring – the 5-year recurrence flow listed in Table 3-1? The 10-year flow? What type of river construction activities will trigger this monitoring? **b.** This section should describe the monitoring techniques to be used (only bathymetry survey mentioned). **c.** As proposed, event- based monitoring will be performed within "6 months" following the observed event. This is not acceptable. Such monitoring should be performed within 1 – 2 months of designated events, using pre-approved monitoring and reporting techniques. **d.** Bathymetry surveys will be performed for each event designated per Table 3-1 (5, 10, 25, 50 and 100 yr flow return events) and "additional" cap integrity monitoring is slated to occur only following 100 year flood events. Given RM 10.9 conditions, these "additional" monitoring methods need to be described and should be implemented for event -based flows of 10, 25 and 50 year return events that occur within the first 30 years of monitoring. This will develop a cap integrity track record in relation to these possibly more frequent, but less severe flow events. **e.** This section further states that due to concerns with cap consolidation and possible mis-interpretation as erosion, the "underlying source of the elevation change (…..) must be determined prior to initiating additional monitoring". However, it may not be possible to differentiate between these two "sources" until additional monitoring is performed. Since use of bathymetry alone to monitor cap functionality may not be completely reliable, other measurement lines of

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evidence need to be used/described in this report. In addition, whenever a pre-designated sediment bed elevation change is noted (regardless of reason), a minimum set of pre-designated monitoring techniques should be performed with the primary purpose of determining cap integrity relative to capping goals of contaminant containment and separation from the rest of the river.

8. Section 3.3, page 3-1: This draft version of Appendix K does not include the referenced Appendices A-C. Therefore, it is not possible to review the proposed Data Quality Objectives (DQOs) for the monitoring program. However, irrespective of the information provided in these appendices, the DQOs for the monitoring program should be stated in this section of the document.

9. Section 4.1, page 3-1: This section indicates that the cap will consolidate at least 9 inches in depth – this is almost 40% of the original 24-inch cap thickness. Since it could be expected that there will be minimal consolidation of the armor and active layers, and the sand layer is only 6 inches thick, this implies that most of this consolidation will be the result of compacting the underlying contaminated sediment; this could result in slope instabilities and/or the enhanced advection/diffusion of groundwater into the cap. Also, this large change in depth (relative to the cap thickness) suggests that bathymetric surveys will be of limited use in evaluating the stability and functionality of the cap.

10. Section 4.2, page 4-1: Monitoring of the armor layer should focus on evaluating the thickness of the cap, using visual means and physical probing measurements. As noted above, use of bathymetric data to monitor the cap is problematical. Poling should be conducted to penetrate through the armor layer to the underlying geotextile, thus determining the thickness of the armor layer.

11. Section 5, Chemical Performance Monitoring, page 5-1 – **a.** This section provides an overview of proposed pore water collection and analysis to determine cap effectiveness (see comment … above). **b.** Missing is the important link/comparison to pre-remedial conditions, such as the pore water data to be collected per Pre-Final Design Addendum D. This link needs to be incorporated through program objectives and related sampling, analytical and evaluation methods. **c**. In the current plan, Phenanthrene and mercury are the analytes chosen for this purpose. However, for initial monitoring, and for comparison to pre-remedial conditions, collection and analysis of samples for 2,3,7,8-TCDD and total PCBs is also recommended. If Phenanthrene is found to be a reliable indicator parameter for 2,3,7,8-TCDD and total PCBs, consideration can be given to dropping these contaminants in future long term monitoring.

12. Section 5.1, page 5-1: The concentrations of phenanthrene and mercury in the contaminated sediment underlying the cap should be compared to that in current surface water quality (needs to be determined) and nearby surface sediment of the Passaic River. In order to use these contaminants as indicators of cap functionality, their concentrations must be greater than those in the ambient environment. Additional information should be provided on how well the solubility of phenanthrene compares to that of the lower molecular weight PCBs (unless these are not prevalent in the TCRA).

13. Section 5.2, page 5-1: Please describe how the length of time needed for the SPMEs and peepers to reach equilibrium with the surrounding pore water will be determined. Removal of the armor layer to install these devices will significantly disrupt any "pore water" present, probably rendering the data collected of limited applicability for its intended use.

14. Section 6.1, Cap Maintenance Trigger, page 6-1 –The risk based levels to be used for determining chemical breakthrough need to be presented with appropriate rationale and/or technical reference. The current proposal of physical trigger is given as "5 percent of the total cap area eroded at least 50 percent through the armor layer". Other scenarios should be considered, along with use of professional judgment,

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to be more proactive, rather than only initiating cap maintenance under 1 set of physical change conditions. This section therefore be expanded; a detailed cap maintenance decision-tree should be developed with a series of potential trigger criteria and response actions identified.

15. Section 6.2, page 6-1, Bullet #3: Please describe the kind of institutional controls that could be implemented.

16. Section 6.2, page 6-1, Bullet #5: Increasing monitoring is not an appropriate "maintenance" reaction to a cap maintenance trigger. However, if the need to perform cap maintenance is identified, Event-based Monitoring should be implemented.

Additional Comments

Appendix C, design drawings, and Appendix J, Construction QA, no comments were provided and defer to subaqueous cap design engineers within either USEPA or USACE for the information in these documents.

Appendices E, G and I: These appendices were not provided to the NJDEP for review and were not posted to the sharepoint website for the NJDEP's review.

A separate email with comments will be provided on Monday January 7, 2013 for comments on the December 2012 River Mile 10.9 Characterization Addendum D, received by the NJDEP on 12/17/2012.

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